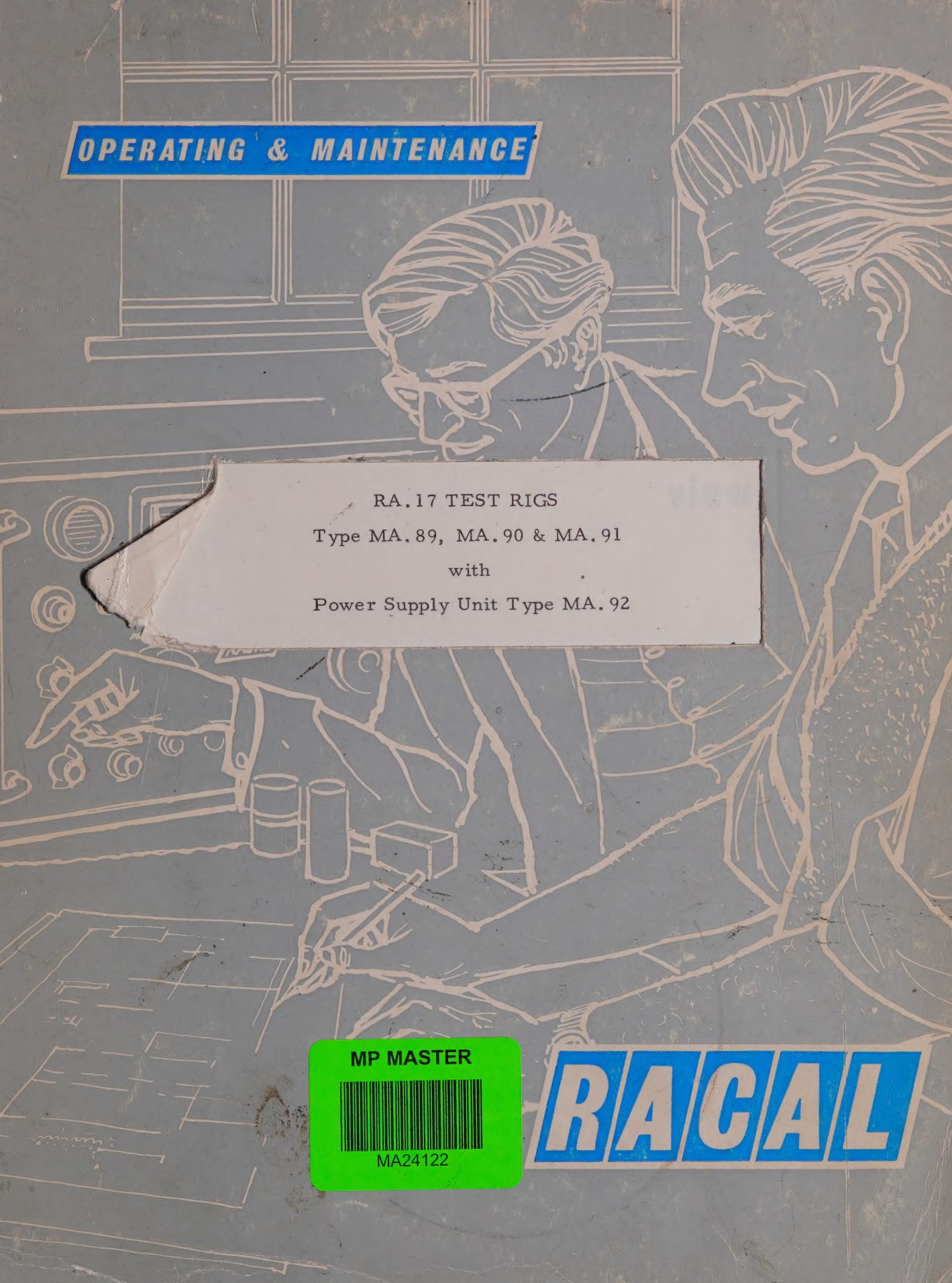

OPERATING & MAINTENANCE

RA.17 TEST RIGS

Type MA.89, MA.90 & MA.91

with

Power Supply Unit Type MA.92

MP MASTER
MA24122

RACAL

RA.17 TEST RIGS

Type MA.89, MA.90 & MA.91

with

Power Supply Unit Type MA.92

Operating Manual

Technical Handbooks Department

RACAL ELECTRONICS LIMITED
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THE NEXT TWO PAGES

concern all users of electrical equipment from a different point of view

•

read carefully . . . . . it

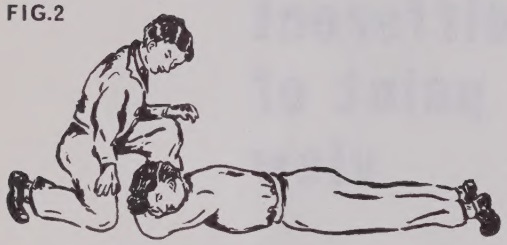
COULD AFFECT YOU

FIRST AID in case of Electric Shock

FIG.1

1. *SWITCH OFF.* If this is not possible, *PROTECT YOURSELF* with dry insulating material and pull the victim clear of the conductor.
   DON'T TOUCH THE VICTIM WITH YOUR BARE HANDS until he is clear of the conductor, but *DON'T WASTE TIME.*

FIG.2



2. (a) Lay patient face down with head to one side, arms bent and forehead on his hands to keep mouth and nose clear. (see Fig.1)
   (b) Give one or two firm thumps with flat of hand between his shoulders.
   (c) Kneel at his head, one knee near the head and your other foot alongside the elbow. (see Fig.2)
   (d) Place your hands on his shoulder blades with thumbs touching on the mid-line and and fingers pointing towards his feet. (see Fig.3)

FIG.3

3. (a) Bend forward with your arms straight and apply weight lightly. (see Fig.4)
   (b) Release pressure gradually and slide your hands to grip him just above the elbows. (see Fig.5)
   (c) Draw his arms and shoulders towards you by leaning backwards with your arms straight till you feel resistance, but without lifting his chest off the ground. (see Fig.6)
   (d) Lay his arms down and slide your hands on to the shoulder blades.

   Repeat paragraph 3 at a rate of 9 times to the minute until breathing is restored, & then omit the back pressure but continue the movement at a rate of 12 times to the minute.

HAVE SOMEONE ELSE

SEND FOR DOCTOR

FIG.4

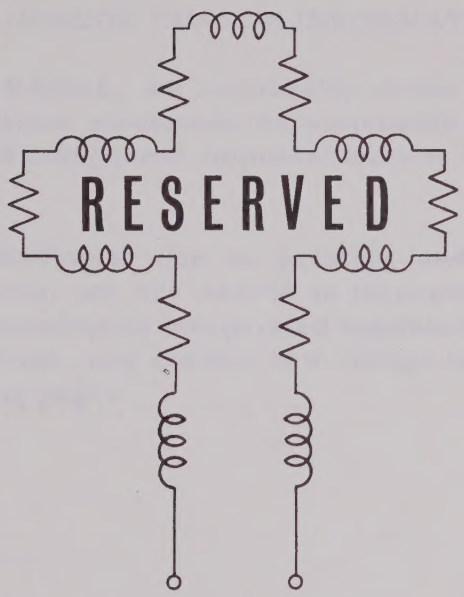
FIG.5

KEEP PATIENT WARM

AND LOOSEN HIS CLOTHING

FIG.6

DO NOT ***give liquids until patient is conscious***



FOR THOSE WHO MEDDLE WITH *LIVE* WIRES

THE VOLTAGES EMPLOYED IN THIS EQUIPMENT ARE SUFFICIENTLY HIGH TO ENDANGER HUMAN LIFE.

EVERY REASONABLE PRECAUTION HAS BEEN OBSERVED IN DESIGN TO SAFEGUARD OPERATING PERSONNEL.

The Power MUST BE SWITCHED OFF
BEFORE SERVICING EQUIPMENT,

and

GREAT CARE taken
WHEN MAKING INTERNAL ADJUSTMENTS——— etc.,

SWITCH OFF —— PLAY SAFE !!

now . . .

proceed

with

CAUTION

HANDBOOK CHANGE INFORMATION

At RACAL, we continually strive to keep up with the latest electronic developments by adding circuit and component improvements to our equipments.

Sometimes, due to printing and despatch requirements, we are unable to incorporate these changes immediately into printed handbooks. Hence, your handbook may contain new change information on following pages.

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CHAPTER 2 Second v.f.o. test rig Type MA.90

CHAPTER 3 I.F. amplifier test rig Type MA.91

CHAPTER 4 Power supply unit Type MA.92

CHAPTER 1

FIRST V.F.O. TEST RIG

TYPE MA.89

CHAPTER 1

FIRST V.F.O. TEST RIG

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CHAPTER 1

FIRST V.F.O. TEST RIG

Introduction

1. The Racal Test Rig Type MA.89 has been designed to facilitate the alignment of the first v.f.o. module comprising r.f. amplifier, first v.f.o. and mixer stages.

2. The test rig provides such circuitry as is necessary for simulating the conditions affecting the module whilst under test.

Test Equipment Requirements

3. The following list of test equipment will be required:-

1 - Racal Test Rig assembly Type MA.89

1 - Racal Power Supply Unit Type MA.92

1 - Racal pointer assembly

1 - Wavemeter 35-70Mc/s or (Racal Calibrator to special order)

1 - Signal Generator 450kc/s-40Mc/s

1 - Valve Voltmeter 0-20V

1 - Signal Generator 1-30Mc/s

Assembly

4. Reference should be made to figs. 1 and 2 at the end of this chapter.

(1) Remove the two fixing screws from the retaining clips on the test rig.

(2) Place the first v.f.o. module on the test rig aligning the fixing holes with those on the test rig, insert the fixing screws and secure. Fit the base cover and remove valve V5.

(3) On the underside of the chassis, connect the braid of the coaxial cable to the black terminal (X2) and the central conductor to the red terminal (X1).

(4) Connect the four-pin socket to the plug.

(5) Connect the octal base plug to the corresponding socket on the power unit.

(6) Connect the red, orange and yellow leads to their appropriate colour marked terminals. Red - X5, orange - X6 and yellow - X7.

Signal Image Filter Tests

5. (1) Connect a valve voltmeter, shunted to 12pF, between test point 2 and chassis. Set the AE RANGE MC/S switch (S2) to WIDEBAND.

(2) Connect the output from the signal generator to the SIG. GEN. INPUT socket on the test rig and set the generator to CW.

(3) Set the generator frequency to 1 Mc/s and adjust the generator output to produce a reading of 0.5V on the valve voltmeter.

(4) Using (3) above as a reference (0dB), check the frequency response from 1 to 40 Mc/s. Over the range 1 to 30 Mc/s the limits are -1dB to +8dB, beyond that the output should fall off sharply and must be less than -20dB from 33 to 40 Mc/s.

R.F. Alignment

6. (1) Set C18 to maximum capacity and connect the valve voltmeter shunted to 12pF, between test point 2 and chassis.

(2) Connect the output from the signal generator to the SIG. GEN. INPUT socket on the test rig and set the generator to 450 kc/s.

(3) Set the AE RANGE MC/S switch (S2) to 0.5-1MC/S position and adjust L9 for maximum output.

(4) Adjust the output of the generator to produce a reading of 0.5V on the valve voltmeter.

(5) Set the signal generator to 1.1 Mc/s and adjust C18 to obtain maximum output.

(6) Repeat operation (4).

(7) Repeat operations (3), (4) and (5) on the other five ranges at the frequencies listed below.

BAND	L.F. END	INPUT FOR 0.5V NOT TO EXCEED	H.F. END	INPUT FOR 0.5V NOT TO EXCEED	COIL
Mc/s					
0.5 - 1	450 kc/s	8.0 mV	1.1 Mc/s	8.5 mV	L9
1 - 2	900 kc/s	8.5 mV	2.2 Mc/s	12.0 mV	L8
2 - 4	1.8 Mc/s	9.0 mV	4.4 Mc/s	8.5 mV	L7
4 - 8	3.6 Mc/s	13.0 mV	8.8 Mc/s	11.0 mV	L6
8 - 16	7.2 Mc/s	18.0 mV	17.6 Mc/s	15.0 mV	L5
16 - 30	14.5 Mc/s	25.0 mV	30.0 Mc/s	25.0 mV	L4

(8) Disconnect the signal generator and the valve voltmeter.

7. First V.F.O. Alignment

(1) Fit the pointer assembly.

(2) Set capcacitor C77 to half maximum capacity.

(3) Connect the output from the wavemeter to socket SKT1 on the test rig.

(4) Check the backlash at both ends of the band and ensure that it does not exceed 1/64 in.

(5) Slacken off the mechanical end stop and set capacitor C76 to maximum capacity. Ensure that the calibration mark on the MEGACYCLES dial lines up with the pointer.

(6) Increase the setting of the MEGACYCLES dial and tighten the mechanical end stop. Ensure that the mechanical end stops operate before the capacitor end stops of both ends of the band.

(7) The Heterodyne Wavemeter should be coupled very loosely to V7 by placing its input lead in the vicinity of the valve envelope.

(8) Set the wavemeter to 40.5 Mc/s, the MEGACYCLES dial to zero and adjust L36 for zero beat in the headphones.

(9) Reset the wavemeter to 69.5 Mc/s, the MEGACYCLES to 29 and adjust Capacitor C77 for zero beat in the headphones.

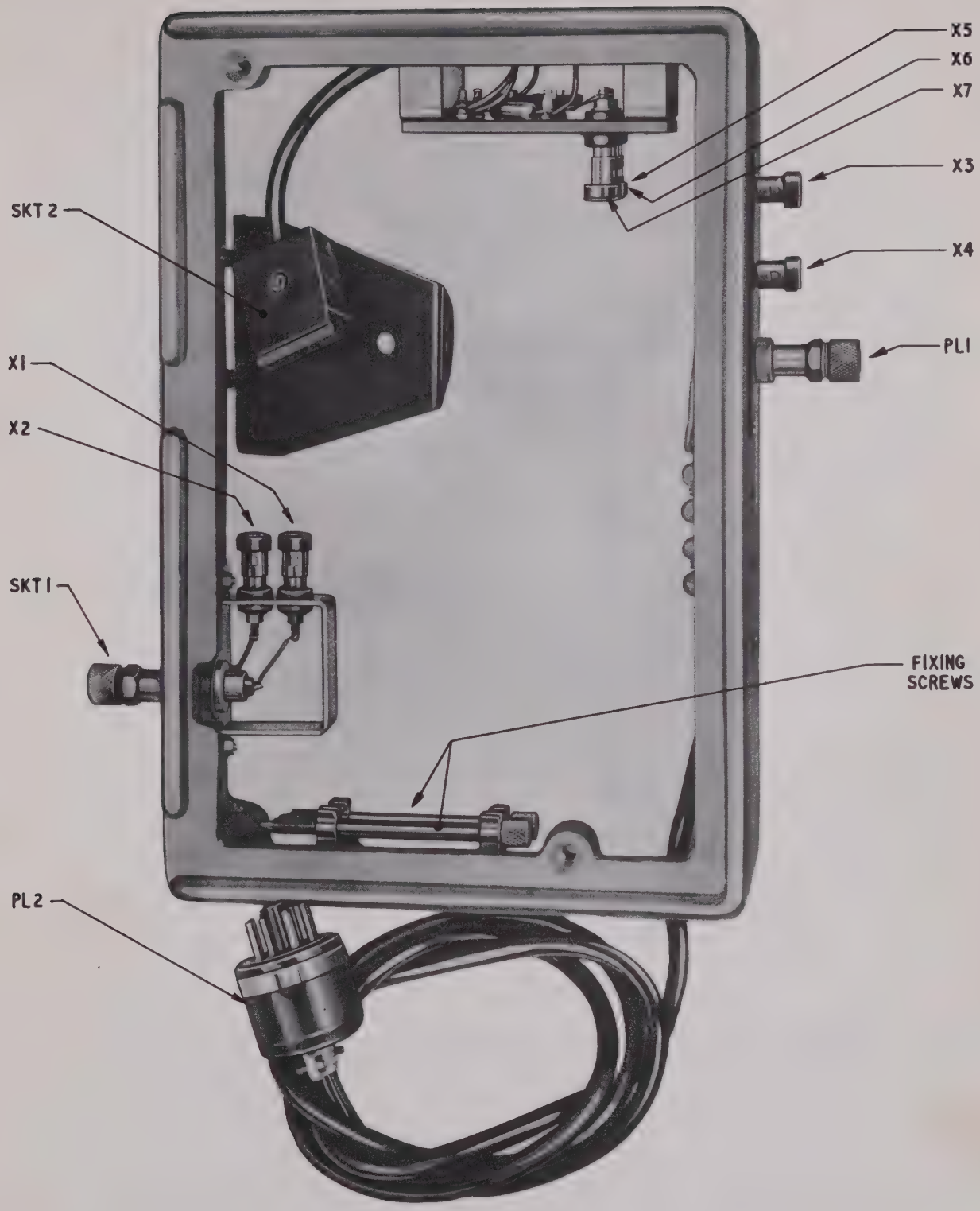
(10) Repeat the above adjustments as necessary.

(11) Check the frequency calibration at 1 Mc/s intervals and ensure that the megacycles positions are reasonably central on the dial markings.

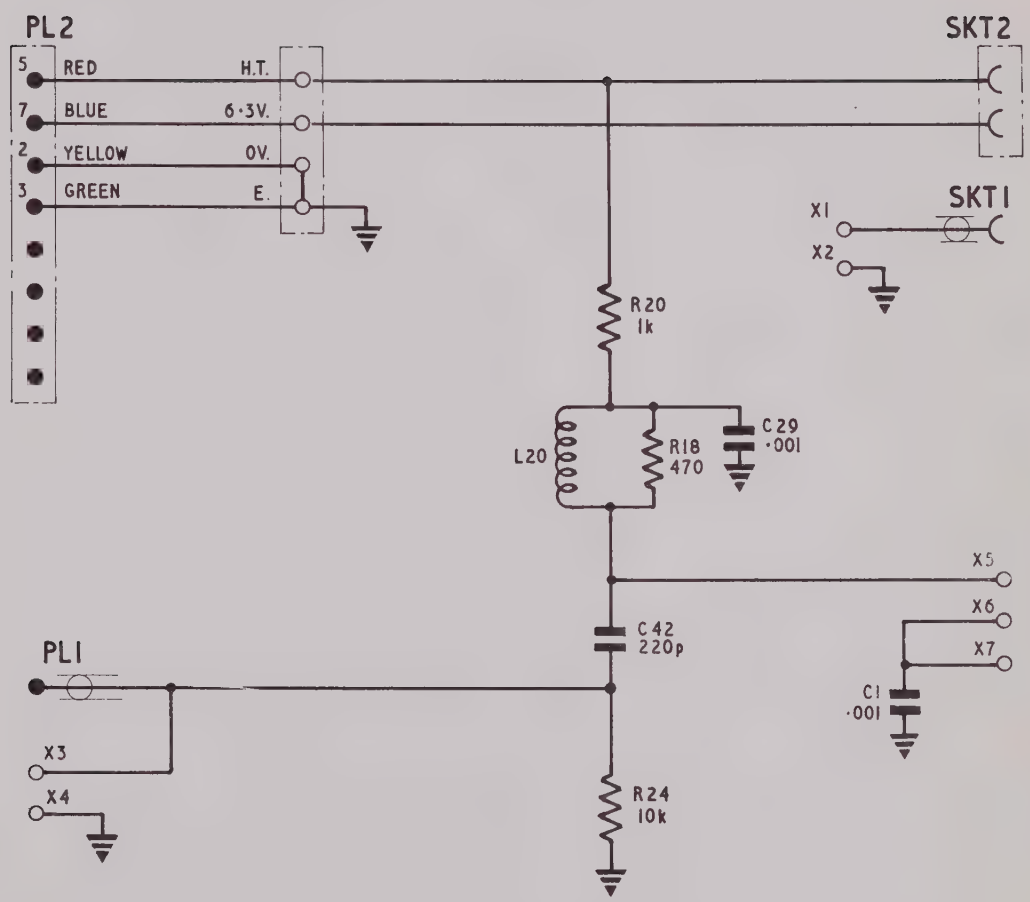
8. Check of Injection Voltage to 1st Mixer and Harmonic Mixer

(1) Connect a valve voltmeter, shunted to 12pF, between test point 2 and chassis.

(2) The reading indicated on the valve voltmeter should be not less than 1.5 volts.



First v.f.o. test rig type MA.89 Fig. 1



9603

Test rig type MA.89 (first v.f.o.): circuit Fig. 2

CHAPTER 2

SECOND V.F.O. TEST RIG

TYPE MA.90

CHAPTER 2

SECOND V.F.O. TEST RIG

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CHAPTER 2

SECOND V.F.O. TEST RIG

Introduction

1. The Racal Test Rig Type MA.90 has been designed to facilitate the alignment and checking of the second v.f.o. module. The front panel of the test rig simulates the conditions of the KILOCYCLES scale on the receiver, thus providing the facility for aligning the scale.

Test Equipment Requirements

2. The following list of test equipment will be required:-

1 - Racal Test Rig Assembly Type MA.90
1 - Racal Power Supply Unit Type MA.92
1 - Heterodyne Wavemeter 2-3 Mc/s or (Racal Calibrator to special order)
1 - Signal Generator 1-30 Mc/s
1 - Serviceable I.F. Amplifier module (ÆA.10884) mounted in a test rig (MA.91)

3. Assembly

(1) Remove the three fixing screws from the retaining clips on the test rig.

(2) Place the second v.f.o. module on the test rig aligning the fixing holes with those on the test rig, insert the fixing screws and secure.

(3) Connect the four-pin socket to the appropriate plug on the underside of the chassis. The other end of this lead is terminated with an octal base plug, connect this to the corresponding socket on the power unit.

4. Check for Backlash

(1) Couple a Heterodyne Wavemeter very loosely to valve V12 by placing its input lead in the vicinity of the valve envelope.

(2) Set the wavemeter to 2.9 Mc/s.

(3) Tune the KILOCYCLES scale towards 200 kc/s from the zero end and set the cursor in line with the 200 kc/s mark after zero beat is obtained in the headphones.

(4) Leaving the cursor in the set position, tune the KILOCYCLES scale towards 200 kc/s from the 1000 kc/s end and note the error when zero beat is obtained. Error should not exceed 0.5 kc/s.

5. Second V.F.O. Alignment

(1) With the wavemeter still coupled to V12, set the wavemeter to 3 Mc/s to check the 100 kc/s point.

(2) Set the cursor on the front panel of the test rig to the central position.

(3) Set the KILOCYCLES scale to 100 kc/s.

(4) Adjust the capacitor C136 to obtain zero beat in the headphones.

(5) Set the wavemeter to 3.1 Mc/s.

(6) Set the KILOCYCLES scale to 0 kc/s.

(7) Adjust capacitor C136 to obtain zero beat in the headphones.

(8) Set the wavemeter to 2.1 Mc/s.

(9) Tune the KILOCYCLES scale towards the 1000 kc/s end to obtain zero beat in the headphones. Lock the KILOCYCLES control.

(10) Loosen the film strips from the sprockets and refit onto the sprockets nearest to 1000 kc/s.

(11) Release the lock on the KILOCYCLES control and set the scale to 0 kc/s.

(12) Set the wavemeter to 3.1 Mc/s.

(13) Adjust capacitor C136 to obtain zero beat.

(14) Repeat operations (8) to (13) inclusive until calibration is correct at 0 kc/s and as close a distance between sprockets will allow at 1000 kc/s.

(15) Set the wavemeter to 3.0 Mc/s and set the KILOCYCLES scale to 100 kc/s.

(16) Adjust the appropriate section of plates on capacitor C139 for zero beat in the headphones.

(17) Reset the wavemeter to 3.1 Mc/s and the scale to 0 kc/s, check that the zero beat is still obtained in the headphones (within 1 kc/s).

(18) Repeat operations (15) to (17) inclusive adjusting capacitor C139 with the wavemeter and KILOCYCLES scale at the following settings:

Wavemeter Mc/s	Scale kc/s
3.1	0
3.0	100
2.9	200
2.8	300
2.7	400
2.6	500
2.5	600
2.4	700
2.3	800
2.2	900
2.1	1000

Alignment of 2-3 Mc/s r.f. circuits

6. Reference should be made to fig.1.

(1) Connect the output from the signal generator to the plug PL2 on the input simulator unit, connect the shorter coaxial lead i.e. socket SKT4 from the 2nd v.f.o. module to the plug PL1 on the simulator unit and connect the 100 kc/s i.f. input lead, terminated with socket SKT6, to the 100 kc/s i.f. output plug PL6 on the second v.f.o. module.

(2) Set the variable capacitor C2, on the simulator unit, to half maximum capacity.

(3) Set the signal generator to 30% modulation.

(4) Set the trimming capacitors C122, C125 and C128, on the second v.f.o., to half maximum capacity.

(5) Set the KILOCYCLES scale to 800 kc/s.

(6) With sufficient output from the signal generator to obtain an indication on the i.f. amplifier CURRENT METER, tune the generator

to 2.2 Mc/s. Peak the generator to obtain maximum indication on the meter.

(7) Adjust coils L57, L58 and L59/60 to obtain maximum indication on the meter, reducing the generator output as the signal increases.

Note ...

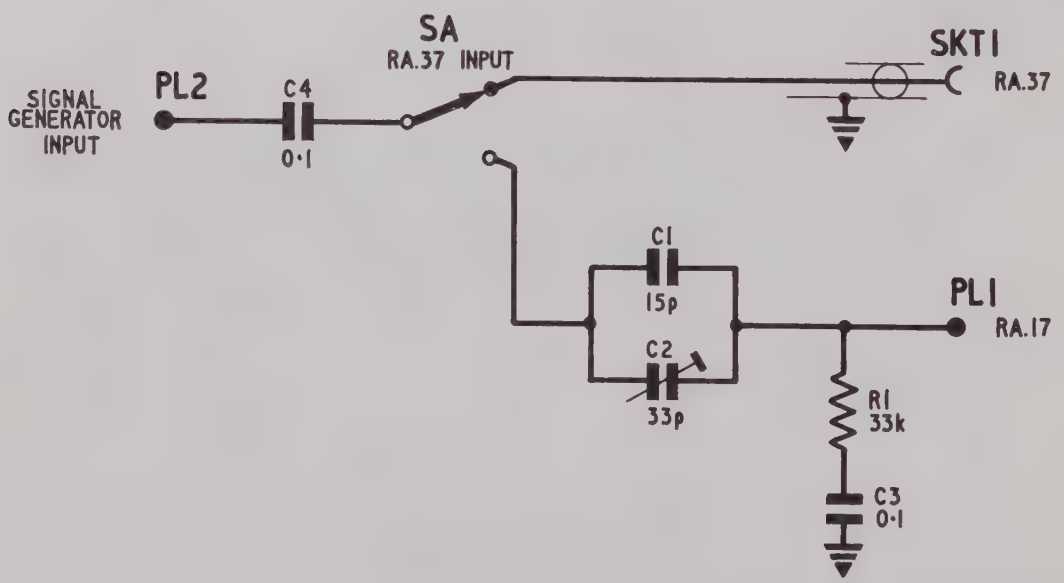
When adjusting L57, L58 and L59/60, two tuning points will be found, the correct one is the one that gives maximum output. Normally found with the core at the bottom end of the coil.

(8) Set the KILOCYCLES scale to 100 kc/s.

(9) Retune the generator to obtain maximum indication on the CURRENT METER.

(10) Adjust trimming capacitors C122, C125 and C128 to obtain maximum indication on the meter.

(11) Repeat (5) to (10) to obtain optimum results.



56119 **Input simulator unit: circuit** **Fig.1**

7. Sensitivity Check for R.F. Signal (2-3 Mc/s)

(1) Replace the second v.f.o. module in the receiver.

(2) Disconnect socket SKT4 and connect a signal generator via a 0.1 mfd. capacitor to socket SKT4.

(3) Set the BANDWIDTH switch to 3 kc/s.

(4) Set the I.F. GAIN control to Max.

(5) Set the signal generator to the following frequencies:

2.9 Mc/s at 360μV for 10mW output
2.5 Mc/s at 360μV for 10mW output
2.2 Mc/s at 300μV for 10mW output

CHAPTER 3

I.F. AMPLIFIER TEST RIG

TYPE MA.91

CHAPTER 3

I.F. AMPLIFIER TEST RIG

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CHAPTER 3

I.F. AMPLIFIER TEST RIG

Introduction

1. The Racal Test Rig Type MA.91 has been designed to facilitate the alignment and checking of the i.f. amplifier.

2. A power unit Type MA.92 supplies the h.t. and l.t. to the test rig and the i.f. amplifier under test.

3. Test procedure for the MA.91

   (1) Connect the octal base plug to the corresponding socket on the front panel of the power unit.

   (2) Set the System switch S1 to MAN.

   (3) Set the METER switch S2 to A.F. O/P.

   (4) Set the B.F.O. switch S4 to off.

   (5) Set the A.V.C. switch S3 to SHORT.

   (6) Set the N.L. switch to off.

   (7) Set the MAN GAIN control RV1 to maximum.

   (8) Connect a lead via a 470kΩ resistor between PL1 (anode) and the red/green terminal, and another lead between PL1 and the blue/brown terminal.

   (9) Connect an audio generator, set to 1000 c/s with an output of 1.2 volts, to plug PL2. The output indicated in the DIODE CURRENT meter should be approximately 10mW.

Brief Technical Description

4. Reference should be made to the circuit diagram (fig.3) at the end of this chapter.

5. The i.f. test rig simulates two stages of the RA.17 receiver and three switches. The two stages, 3rd mixer (V11) and a.f. output (V23), provide

the input and output conditions for the i.f. amplifier module under test.

6. The three switches simulated by the test rig are the A.V.C., B.F.O. and LIMITER.

7. The System switch S1 simulates three positions of the System switch in the receiver. The following conditions exist for each setting of the switch.

(1)	STANDBY	Disconnects the h.t. to the i.f. amplifier stages and to the two stages on the test rig.
(2)	A.V.C.	(a) The h.t. is connected to all stages. (b) Connects h.t. to the b.f.o. when S4 is switched on. (c) Connects the a.v.c. line to the a.v.c. diode.
(3)	MANUAL	(a) The h.t. is connected to all stages (b) Connects the h.t. to the b.f.o. when S4 is switched on. (c) The a.v.c. line is disconnected from the a.v.c. diode.

8. H.T. and l.t. are derived from the power unit via plug PL4. A dropping resistor R14 is connected in series with the -150V line to provide a -25V for gain control purposes.

Test Equipment Requirements

9. The following list of test equipment will be required:-

1 - Racal Test Rig Assembly Type MA.91
1 - Racal Power Unit Type MA.92
1 - Digital Frequency Meter - range 10 c/s - 1 Mc/s (Racal Type SA.21B)

or

1 - Digital Frequency Meter with 100 kc/s Demodulator (Racal Types SA.20 and MA.139)

1 - General purpose oscilloscope
1 - 0.1mfd. capacitor
1 - 4.7kΩ resistor

Assembly

10. Reference should be made to fig. 2.

(1) To install the i.f. amplifier onto the test rig, position the amplifier so that the underside view is facing the front, and at a slight angle, insert the BANDWIDTH spindle through the hole in the plate at the top of the test rig. Carefully position the lower half of the amplifier onto the rig.

(2) Clamp the i.f. amplifier into position.

(3) Remove the large control knob from the dummy spindle on top of the test rig and assemble onto the i.f. amplifier BANDWIDTH spindle.

(4) Connect the coloured leads from the amplifier to the appropriate coloured terminals on the test rig. See fig. 2 for reconnecting leads to tag strips.

(5) Connect the CLIP 1 to pin 3 on the i.f. output transformer (L76).

(6) Connect the short lead, from the i.f. amplifier terminated with a coaxial socket (SKT6), to the plug marked ANODE (PL1).

(7) Connect the octal base plug to the corresponding socket on the front panel of the power unit.

Transformer Alignment

(1) Connect the output from a signal generator to the socket marked INPUT on the test rig.

(2) Connect a coaxial lead from the plug marked I.F. O/P (PL3) to a demodulator.

(3) Connect a 0.1 mfd. capacitor and 4.7k ohm resistor in series between pin 5 of V14 and chassis.

(4) Set the controls as follows:-

I.F. GAIN to maximum (i.f. amplifier chassis)
MAIN GAIN to maximum
NL switch to OFF.
A.V.C. switch to SHORT
B.F.O. switch to OFF
System switch to MAN

METER switch to diode
BANDWIDTH switch to 8 kc/s (i.f. amplifier chassis)

(5) Set the power unit POWER switch to ON and the H.T. switch to ON.

(6) Set the power unit VOLTS meter to 215 volts by adjustment of the preset control SET VOLTS.

(7) Set the signal generator to 100 kc/s.

(8) Adjust C179, C191 and C195B for maximum indication on the DIODE CURRENT meter.

(9) Disconnect the series capacitor and resistor from V14 and connect them between pin 1 of V16 and chassis.

(10) Adjust C171 for maximum indication on the DIODE CURRENT meter. Disconnect the capacitor and resistor.

I.F. Filter Checks (bandwidth)

Note 1 ..... All the following output sensitivity figures are relative to 80μA on the DIODE CURRENT meter for an input better than -68dB relative to 1 volt.

Note 2 ..... If employing a digital frequency meter Racal Type SA.21B, the equipment should be connected to the socket marked I.F. O/P.

12. (1) Connect the output from the demodulator to a Digital Frequency Meter.

(2) Set the BANDWIDTH switch to 1.2 kc/s.

(3) Increase the signal generator output by 6dB.

(4) Tune the signal generator to the higher frequency to reduce the output on the meter to 80μA and note the bandwidth reading on the digital frequency meter.

(5) Tune the signal generator to the lower frequency to reduce the output to 80μA and again note the reading on the digital frequency meter.

(6) Repeat paras. 4 and 5 with the BANDWIDTH switch set first to 3 kc/s and then to 8 kc/s

(7) Set the BANDWIDTH switch to 750 c/s.

(8) Tune the signal generator through the pass-band and ensure that the peak-to-trough ratio does not exceed 3dB and that the peaks are approximately equal in amplitude. The 6dB points should be between 700 and 800 c/s and the mid-position should not deviate from 100 kc/s by more than 25 c/s.

(9) Set the BANDWIDTH switch to 300 c/s and check the bandwidth. The 6dB points should be between 270 and 330 c/s apart and the deviation of the mean from 100 kc/s should not exceed 25 c/s.

(10) Set the BANDWIDTH switch to 100 c/s and check the bandwidth. The 6dB bandwidth should be between 80 and 120 c/s and the deviation from the mean less than 25 c/s.

13. Diode Current Check

(1) Set the BANDWIDTH switch to 8 kc/s.

(2) Modulate the signal generator 30%.

(3) Set the METER switch to A.F. O/P.

(4) Adjust signal generator until the DIODE CURRENT meter reads 10mW.

(5) Set the METER switch to DIODE. The diode current should read approximately 15μA.

14. Diode Current Distortion Check

(1) Connect the oscilloscope to the socket marked C.R.O. on the test rig.

(2) Modulate the signal generator 70%.

(3) Increase the signal generator output; distortion to occur at no less than 70μA.

15. Limiter Check

(1) With the oscilloscope still connected modulate the signal generator 15%.

(2) Adjust the output of the signal generator until the DIODE CURRENT meter indicates 80μA.

(3) Set the NL switch to ON.

(4) Increase modulation, noting at what modulation depth clipping occurs. This should be between 25 and 40%. Set the NL switch to OFF and switch modulation off.

16. B.F.O. Injection Check

(1) Switch the signal generator off.

(2) Set B.F.O. switch to ON.

(3) The DIODE CURRENT meter should indicate between 110 and 120μA. Set B.F.O. switch to OFF.

17. I.F. GAIN Control Check

(1) Switch the signal generator on.

(2) Adjust the signal generator output so that the DIODE CURRENT meter indicates 20μA.

(3) Set the I.F. GAIN control to minimum.

(4) Increase the signal generator output until the meter again indicates 20μA.

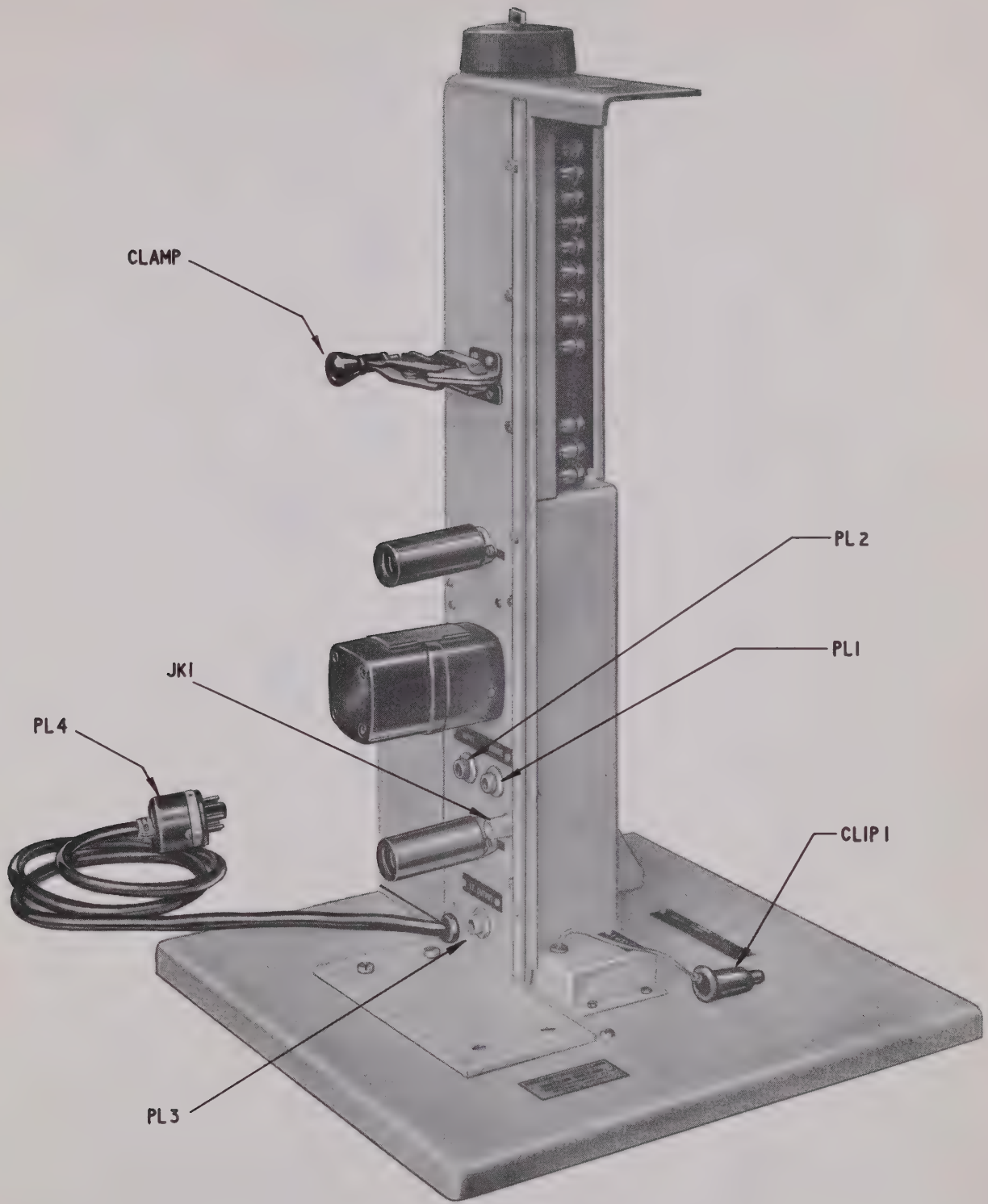
(5) The range of the I.F. GAIN control to be not less than 64dB. Set the I.F. GAIN control to maximum.

18. A.V.C. Check

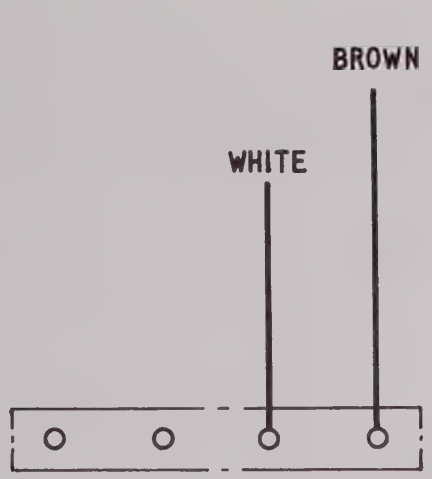
(1) Set System switch to A.V.C.

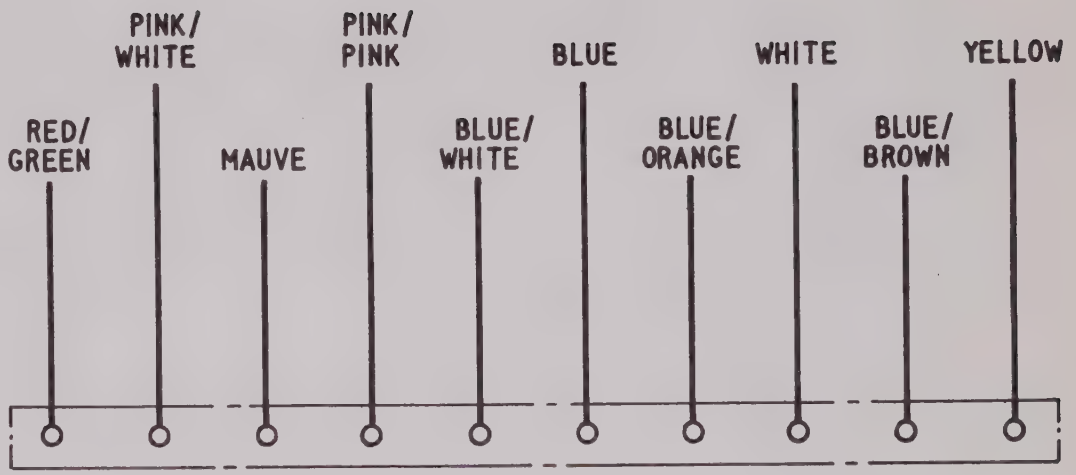
(2) Adjust the signal generator to -68dB relative to 1 volt (400μA) and note the reading indicated on the DIODE CURRENT meter.

(3) Increase the signal generator output by 66dB and note the reading on the meter. The increase in diode current should not be greater than 6dB.



I.f. amplifier test rig type MA.91 Fig. 1





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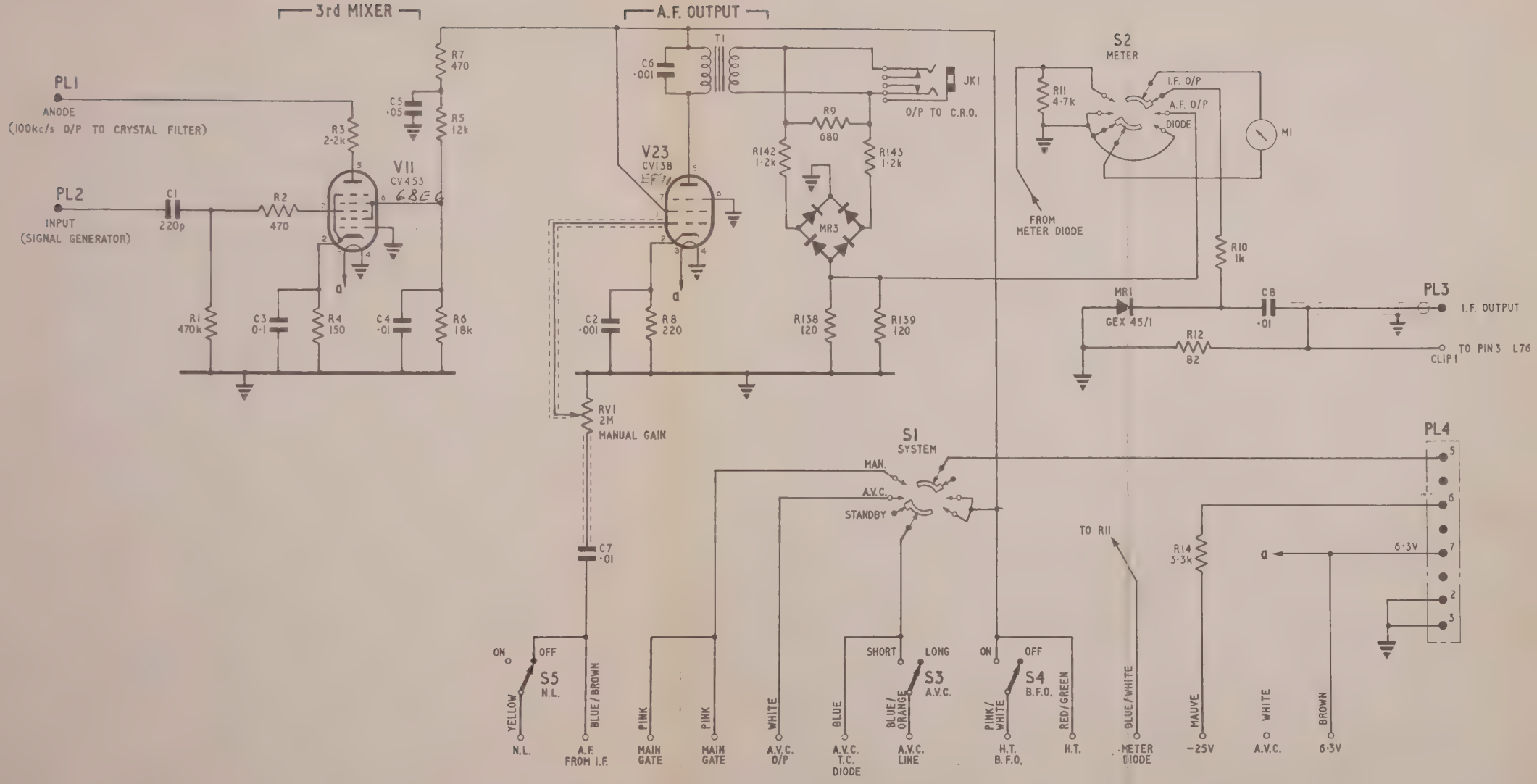
RA.17 terminal tag strips

Fig.2



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Test rig type MA.91 (i.f. amplifier): circuit

Fig.3

CHAPTER 4

POWER SUPPLY UNIT

TYPE MA.92

CHAPTER 4

POWER SUPPLY UNIT

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CHAPTER 4

POWER SUPPLY UNIT

GENERAL DESCRIPTION

Introduction

1. The Power Supply Unit Type MA.92 is designed to provide a stabilized d.c. from +200V to +300V at 250mA, in two ranges, and a stabilized and fixed negative supply of -150V. Three heater supplies are available, one 6.3V at 2.5A and two 6.3V at 3A.

Specification

2. Positive h.t. output

D.C. Voltage	
Range 1	+200 to 250V)
Range 2	+250 to 300V) stabilized
D.C. current	0-250mA (LOAD 1K 6J
Effective source resistance	1 ohm approx.
Input regulation	0.1% for ±6% mains variation.
Ripple voltage	8mV r.m.s.
A.C. output	4 or 6.3V at 3A)
	4 or 6.3V at 3A) unstabilized
	6.3V at 2.5A)

Negative h.t. output

D.C. voltage	-150V stabilized.
D.C. current	0-15mA. (LOAD 10K 2
Total regulation	3% total change in voltage for change of load from 0 to 15mA and change of mains voltage within ±6%.

Ripple voltage	100mV r.m.s.			
Mains input	200-250V, 45-65 c/s.			
Dimensions	Height	Width	Depth	
	8.5/8	19	12.5/8	in.
	21.60	48.25	31.75	cm.
Weight	33 lb.			
	15 kg.			
Valve complement	V1: 5V4G			
	V2: 5V4G			
	V3: 6080			
	V4: 6080			
	V5: ECF80			
	V6: 150C4			
	V7: 85A2			

INSTALLATION AND SETTING-UP

Initial Inspection

3. After carefully unpacking the equipment, ensure that all valves and screening cans are firmly in place and that no packing materials remain.

Mains (Power) Supply

4. Set the mains transformer and heater transformer to their appropriate voltage tappings to suit the local mains supply. Adjustments are made by soldered joints.

5. Connect a 3-core mains lead (not provided) to the free 3-pin socket provided with the unit.

Setting-Up

6. (1) Set the POWER switch to ON.

(2) Connect the octal plug, from the test rig, to the socket on the front panel.

(3) Set the H.T. switch to on and allow a few minutes for the equipment to warm-up.

(4) Set the VOLTS meter to 215 volts by use of the preset control SET VOLTS mounted on the front panel.

CIRCUIT DESCRIPTION

7. A stabilized output from +200V to +300V at 250mA, in two ranges, is available. The output voltage is adjustable by means of a preset control, SET VOLTS (RV1).

8. The mains input transformer and heater transformer are tapped to provide for inputs of 200-250V.

9. Two full-wave rectifier valves V1 and V2, each connected in parallel, supply a direct voltage to two stabilizer valves V3 and V4 connected in parallel. These valves are controlled by a two stage amplifier circuit employing an ECF80 triode-pentode whch obtains its reference voltage from a neon stabilizer V7. The potentiometer in the cathode circuit of the triode portion of the control valve may be adjusted to set the positive h.t. output to any desired level between 225 and 325 volts.

10. Two metal rectifiers, connected in a full-wave circuit, provide a stabilized and fixed negative supply of -150V; this supply is maintained at this level, within ±1.5% for variations of load between 0 and 15mA, by a neon stabilizer V6.

11. A separate heater transformer provides 6.3V at 2.5A (one side earthed) with additional windings tapped at 4V, each supplying 6.3V at 3A.

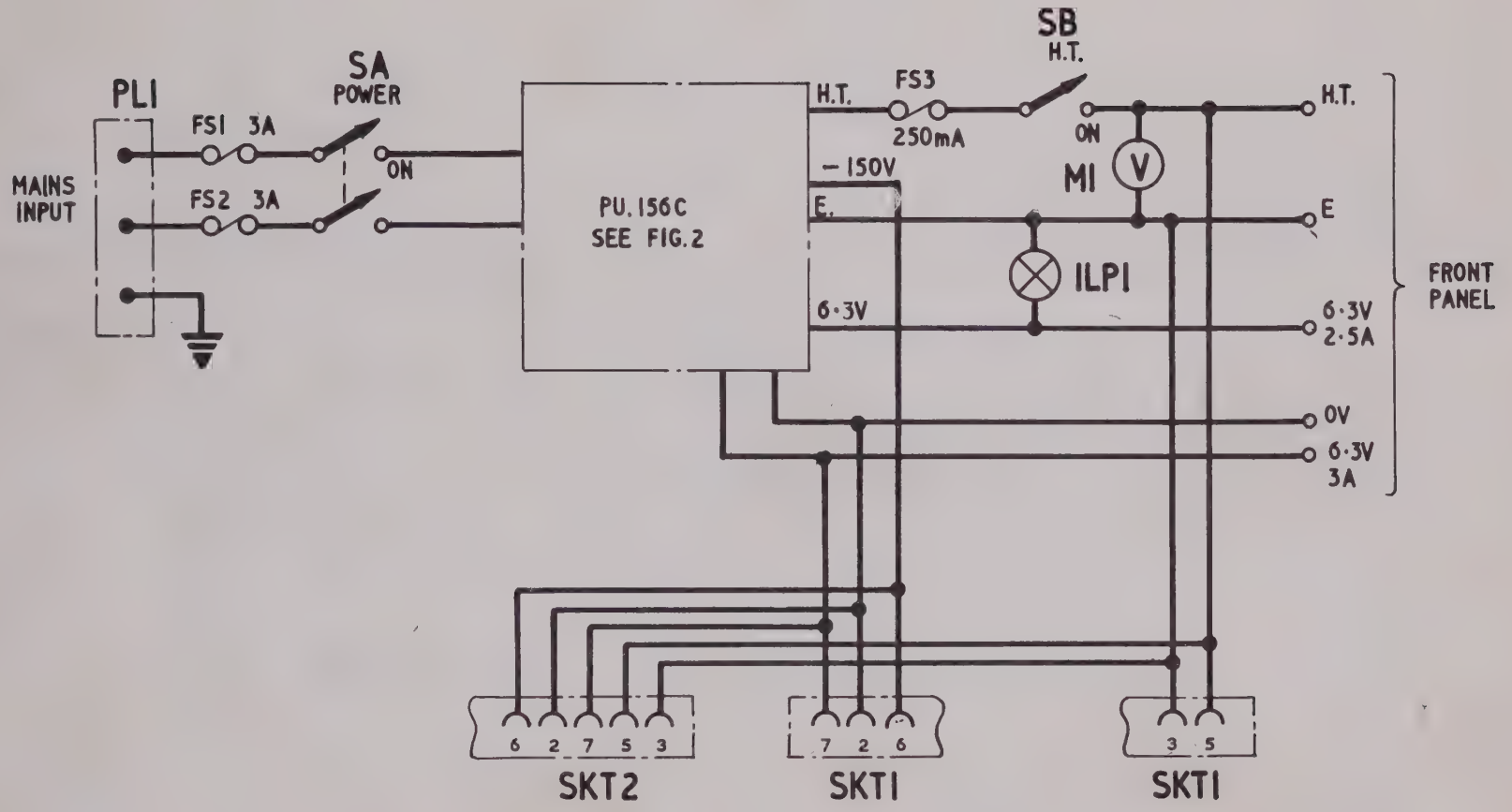

Fig.1

Control panel: circuit

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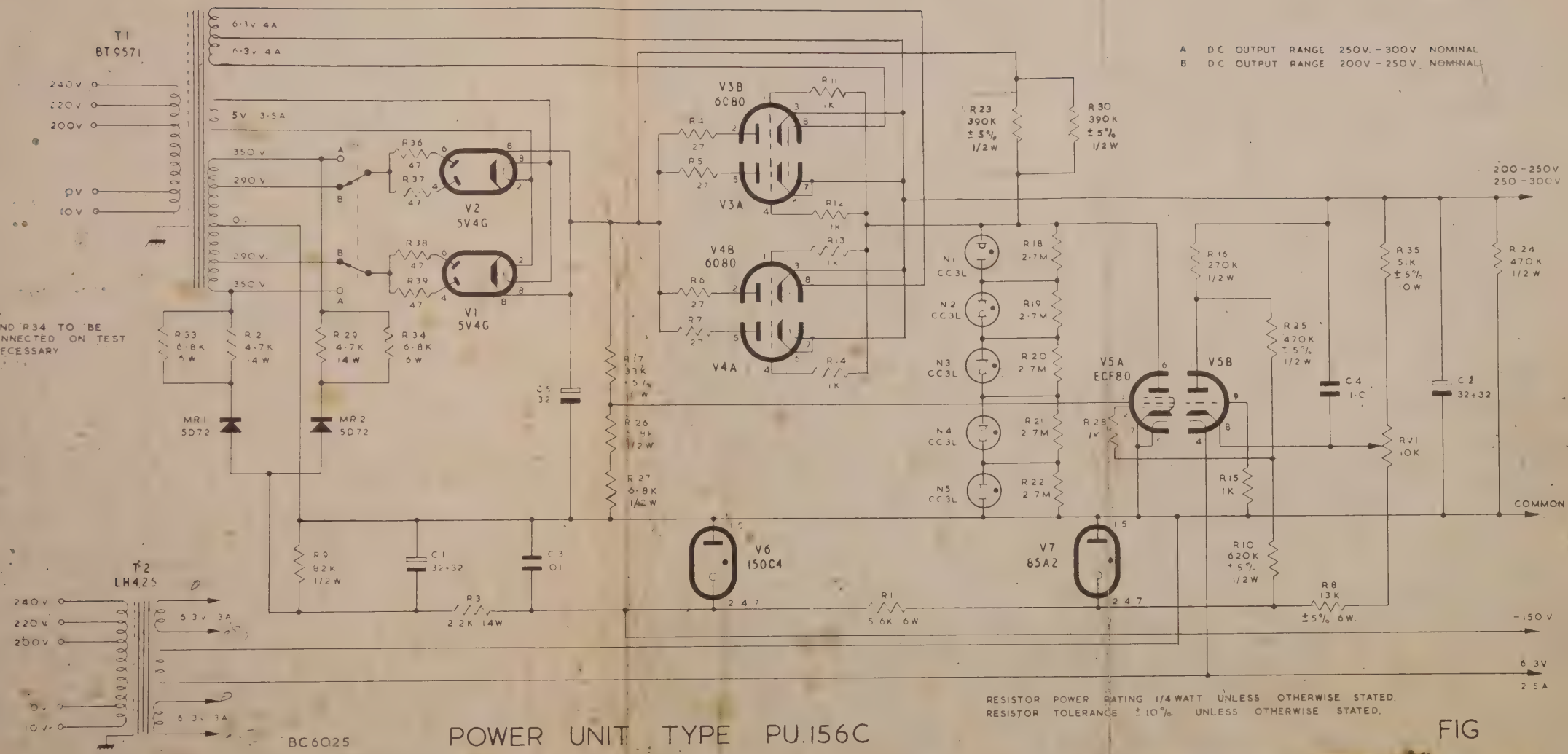


A D.C. OUTPUT RANGE 250V. – 300V NOMINAL
B D.C. OUTPUT RANGE 200V – 250V NOMINAL

RESISTOR POWER RATING 1/4 WATT UNLESS OTHERWISE STATED.
RESISTOR TOLERANCE ± 10% UNLESS OTHERWISE STATED.

POWER UNIT TYPE PU.156C

FIG

SECTION 2

COMPONENTS LIST

Cct. Ref.	Value	Description	Rat.	Tol. %	N. A. T. O. No.	Manufacturer
First V. F. O. Test Rig Type MA. 89						
	Resistors				5905-99-	
R18	470Ω	Carbon	½W	10	022-1195	Erie 8
R20	1 kΩ	Carbon	¼W	10	022-2004	Erie 16
R24	10 kΩ	Carbon	¼W	10	022-2130	Erie 16
	Capacitors					
C1(2) C29	0.001 µF (see C1)	Ceramic	350V			Erie K3500/AD
C42	220 pF	Silver mica	350V	5		J. Matthey CX-22S
	Plugs and Sockets					
PL1		Coaxial				Magnetic Devices 9580013
PL2		Octal base				McMurdo XL8/UUP
SKT1		Coaxial				Magnetic Devices 9580023
		Socket for PL1				Magnetic Devices 9580020
		Plug for SKT1				Magnetic Devices 9580010
SKT2		4-way				Belling Lee L. 744
	Inductor				5950-99-	
L20	Coil				972-9577	Racal AA. 4780
	Supplementary Components					
		Terminal block 8-way				Racal BD. 11912
(5)		Terminal (black)				Painton 311147
(2)		Terminal (red)				Painton 313184
(2)		Screws (securing chassis)				Racal AD. 11901
		First v. f. o. pointer assembly				Racal. BA. 14168
Second V. F. O. Test Rig Type MA. 90						
		Escutcheon				Racal CD. 4564
		Slider				Racal AD. 4568
		Clip and pointer assembly				Racal AA. 4566
		Terminal block 4-way				Belling Lee L. 744
		Screw				Racal AD. 11915
		Screws (2)				Racal AD. 11901
	Plug					
		Octal base				McMurdo XL8/UUP

Cct. Ref.	Value	Description	Rat.	Tol. %	N. A. T. O. No.	Manufacturer
Second V. F. O. Input Simulator Unit						
	Resistor				5905-99-	
R1	33 kΩ	Carbon	½W	10	022-2195	Erie 8
	Capacitors				5910-99-	
C1	15 pF	Ceramic	750V	5	011-8606	Lemco 310 N750
C2	33 pF	Trimmer			016-0047	Wingrove & Rogers C31-01/1
C3(2)	0.1 µF	Paper	350V	20	011-5506	T. C. C. CP45N
C4	(see C3)					
	Switch					
SA		Input switch				Racal SW3
	Plugs and Sockets				5935-99-	
PL1(2)		Coaxial			054-0151	Power Controls
PL2	(see PL1)					
SKT1		Coaxial			054-0155	Power Controls
	Knob				5355-99-	
		Knob			943-4799	Racal AA. 15472
I. F. Amplifier Test Rig Type MA. 91						
	Resistors				5905-99-	
R1	470 kΩ	Carbon	¼W	10	022-3121	Erie 16
R2	470Ω	Carbon	¼W	10	022-1193	Erie 16
R3	2.2 kΩ	Carbon	½W	10	022-2048	Erie 8
R4	150Ω	Carbon	½W	10	022-1132	Erie 8
R5	12 kΩ	Wirewound	3W	5	011-3346	Painton P306
R6	18 kΩ	Carbon	½W	10	022-2165	Erie 8
R7	470Ω	Carbon	½W	10	022-1195	Erie 8
R8	220Ω	Carbon	½W	10	022-1153	Erie 8
R9	680Ω	Carbon	½W	10	022-1216	Erie 8
R10	1 kΩ	Carbon	½W	10	022-2006	Erie 8
R11	4.7 kΩ	Carbon	½W	10	022-2090	Erie 8
R12	82Ω	Carbon	¼W	10	022-1100	Erie 16

Cct. Ref.	Value	Description	Rat.	Tol. %	N. A. T. O. No.	Manufacturer
I. F. Amplifier Test Rig Type MA. 91 (cont'd)						
	Resistors				5905-99-	
R13	Deleted					
R14	3.3 kΩ	Wirewound	3W	5	011-3332	Welwyn AW. 3115
R138(2)	120Ω	Carbon	1/8W	5	021-9046	Erie 109
R139	(see R138)					
E142(2)	1.2 kΩ	Carbon	1/8W	5	021-9118	Erie 109
R143	(see R142)					
	Potentiometer					
RV1	2 MΩ	Manual gain Log. Law				A. B. Metals Type 37
	Capacitors				5910-99-	
C1	220 pF	Silver mica	350V	5		J. Matthey CX-22S
C2	0.001 µF	Ceramic	350V	-20 +80		Erie K3500/AD
C3	0.1 µF	Paper	150V	20	011-5560	Hunts W49/B500K
C4(3)	0.01 µF	Paper	500V	20	012-0123	Hunts W97/BM21K
C5	0.05 µF	Paper	350V	20	011-5559	Hunts W49/B511K
C6	(see C2)					
C7	(see C4)					
C8	(see C4)					
	Switches					
S1(2)		System				Racal BSW. 12237
S2		Meter (see S1)				
S3(3)		A. V. C.				NSF Z510554
S4		B. F. O. (see S3)				
S5		Noise limiter (see S3)				
	Plugs and Sockets				5935-99-	
PL1(3)		Coaxial (anode)			011-9806	Magnetic Devices 9580013
PL2	(see PL1)	(Input)				
PL3	(see PL1)	(i. f. output)				
PL4		Octal base (h. t., l. t.)				McMurdo XL8/UUP
JK1		Output jack				Igranic P73
		Jack plug				Igranic P50
		Coaxial plug				Amphenol UG260B/U
		Sockets for PL1, PL2 & PL3			012-2827	Magnetic Devices 9580020

Cct. Ref.	Value	Description	Rat.	Tol. %	N. A. T. O. No.	Manufacturer
I. F. Amplifier Test Rig Type MA. 91 (cont'd)						
	Valves					
V11		Heptode			CV453	6BE6
V23		Pentode			CV138	EF91
	Valve Holders					
V11(2)		Valve holder			5935-99-056-0127	McMurdo XM7/UC1
V23	(see V11)					
V11(2)		Screening can			5960-99-056-3003	McMurdo 4/6
V23	(see V11)					
	Transformers					
T1		Output			5950-99-911-6454	Racal T. 1080
	Rectifiers					
MR1		Diode				G. E. C. GEX. 45/1
MR3		Metal rectifier			6130-99-943-6183	S. E. I. Ltd.
Meter		200 microamps				E. Turner W909 (with AD4868 scale)
	Supplementary Components					
		Clamp with plastic grip				Speetog ST. 50D with ST. 54
		Tag strip 6 way				Wingrove & Rogers TS1-06
		Tag strip 4 way				Wingrove & Rogers TS1-04
(13)		Spring terminals				Painton 311147
Power Supply Unit Type MA. 92						
	Resistors				5905-99-	
R1	5.6 kΩ	Wirewound	6W	5	011-3338	Welwyn AW3115
R2	4.7 kΩ	Wirewound	14W	10	011-3413	Welwyn AW3112
R3	2.2 kΩ	Wirewound	14W	10	011-3405	Welwyn AW3112
R4(4)	27Ω	Carbon	$\frac{1}{4}$W	10	022-1037	Erie 16
R5	(see R4)					
R6	(see R4)					
R7	(see R4)					

Cct. Ref.	Value	Description	Rat.	Tol. %	N. A. T. O. No.	Manufacturer
Power Supply Unit Type MA. 92 (cont'd)						
	Resistors				5905-99-	
R8	13 kΩ	Wirewound	6W	5	011-3347	Painton 306A
R9	82 kΩ	Carbon	½W	10	022-3030	Erie 8
R10	620 kΩ	Carbon	½W	5	021-6744	Welwyn C22
R11(6)	1 kΩ	Carbon	¼W	10	022-2004	Erie 16
R12	(see R11)					
R13	(see R11)					
R14	(see R11)					
R15	(see R11)					
R16	270 kΩ	Carbon	½W	10	022-3093	Erie 8
R17	33 kΩ	Wirewound	10W	5	011-8246	Welwyn AW3111
R18(5)	2. 7 MΩ	Carbon	¼W	10	022-3217	Erie 16
R19	(see R18)					
R20	(see R18)					
R21	(see R18)					
R22	(see R18)					
R23	390 kΩ	Carbon HS	½W	5	021-6734	Welwyn C22
R24	470 kΩ	Carbon	½W	10	022-3123	Erie 8
R25	470 kΩ	Carbon HS	½W	5	021-6738	Welwyn C22
R26	6. 8 kΩ	Carbon	½W	10	022-2111	Erie 8
R27	(see R26)					
R28	(see R11)					
R29	(see R2)					
R30	(see R23)					
R31	Deleted					
R32	Deleted					
R33	6. 8 kΩ	Wirewound	6W	10	011-3417	Welwyn AW3112
R34	(see R33)					
R35	51 kΩ	Wirewound	10W	5	011-8251	Welwyn AW3111
	Potentiometer					
RV1	10 kΩ	Wirewound			011-9492	Colvern CLR1106/15S
	Capacitors				5910-99-	
C1	32+32 µF	Electrolytic	450V		014-5602	TCC CE 28PE
C2	(see C1)					

Cct. Ref.	Value	Description	Rat.	Tol. %	N. A. T. O. No.	Manufacturer
Power Supply Unit Type MA. 92 (cont'd)						
	Capacitors				5910-99-	
C3	0.01 µF	Paper sleeved	350V		011-5552	TCC CP33S
C4	1 µF	Paper	350V		011-7821	TCC CP91N
C5	32 µF	Electrolytic	700V	Surge	911-6384	TCC 526
	Switches					
SA		Power				Arcolectric T620
SB		H. T.				Arcolectric T620
	Plugs and Sockets					
PL1		Mains input				Bulgin P73
SKT1(2)		Octal base				McMurdo B8/0
SKT2	(see SKT1)					
(2)		Octal base plug				McMurdo XL8/UUP
	Valves					
V1(2)		Full-wave rectifier			CV729	Brimar 5V4G
V2	(see V1)					
V3(2)		Double-triode			CV2984	Mullard 6080
V4	(see V3)					
V5		Triode-pentode			CV5215	Mullard ECF80
V6		Neon Stabilizer			CV1832	Mullard 150C4
V7		Neon Stabilizer			CV449	Mullard 85A2
	Valve Holders					
V1(2)		Valve holder				McMurdo X8U
(2)		Retainer				Electrothermal VRK16
V2	(see V1)					
V3(2)		Valve holder				McMurdo X8U
(2)		Retainer				Electrothermal VRY3
V4	(see V3)					
V5		Valve holder				McMurdo XM9/UC1
		Screening can				McMurdo 7/6
V6		Valve holder				McMurdo XM7/UC1
		Screening can				McMurdo 9/6
V7		Valve holder				McMurdo XM7/UC1
		Screening can				McMurdo 4/6

Cct. Ref.	Value	Description	Rat.	Tol. %	N. A. T. O. No.	Manufacturer
Power Supply Unit Type MA. 92 (cont'd)						
		Transformers				
T1		Mains transformer				Racal BT. 9571
T2		L. T. transformer				Garoner LH425
		Rectifiers				
MR1(2)		Metal rectifier				Westinghouse 5D72
MR2	(see MR1)					
		Meter				
M1		0 - 300V a. c.				Taylor Type 250
		Fuses and Fuseholders				
FS1(2)		Mains fuse	3A			Belling Lee L1055/3 amp.
FS2	(see FS1)					
FS3		H. T. fuse	250 mA			Belling Lee L1055/250 mA
	(3)	Fuseholders				Belling Lee L356
		Lamp				
ILP1		Mains indicating 8V, 0. 3A Red lens				M. E. S. 11 m/m Bulgin D277/RED
		Supplementary Components				
N1(5)		Neon stabilizers			5960-99-000-2266	Hivac CC3L
N2	(see N1)					
N3	(see N1)					
N4	(see N1)					
N5	(see N1)					
		Printed wire board				Technograph 65 and 91
	(2)	Voltage link plug				Clix P61
	(5)	Front panel terminal				Belling Lee L1301

Guarantee

We, Racal Electronics Limited, guarantee, subject to the following terms, to replace or, at our option, repair, free of charge, any components or parts of any goods supplied which fail within 12 months of the date of despatch solely as a result of faulty materials or bad workmanship.

1. Defective components or parts must be returned to our factory carriage paid, and any labour costs involved in refitting into an equipment will be chargeable to the customer.

2. Damage caused by unauthorised alteration or substitution of non-standard parts by incorrect installation or any third party or consequential damage or loss is not covered by this guarantee.

3. This guarantee will apply only if the equipment is bought from Racal Electronics Limited or an authorised vendor at the appropriate prices and terms.

4. Components such as electric bulbs and valves are covered by such guarantee as is given by the manufacturers of those components.

5. This guarantee cannot be altered by any person or Company other than Racal Electronics Limited.

PLEASE COMPLETE FORM BELOW AND RETURN TO SUPPLIER

TEAR OFF HERE

REGISTRATION FORM

Name of Purchaser.....

Address of Purchaser.....

Equipment Type .....

Equipment Serial Number .....

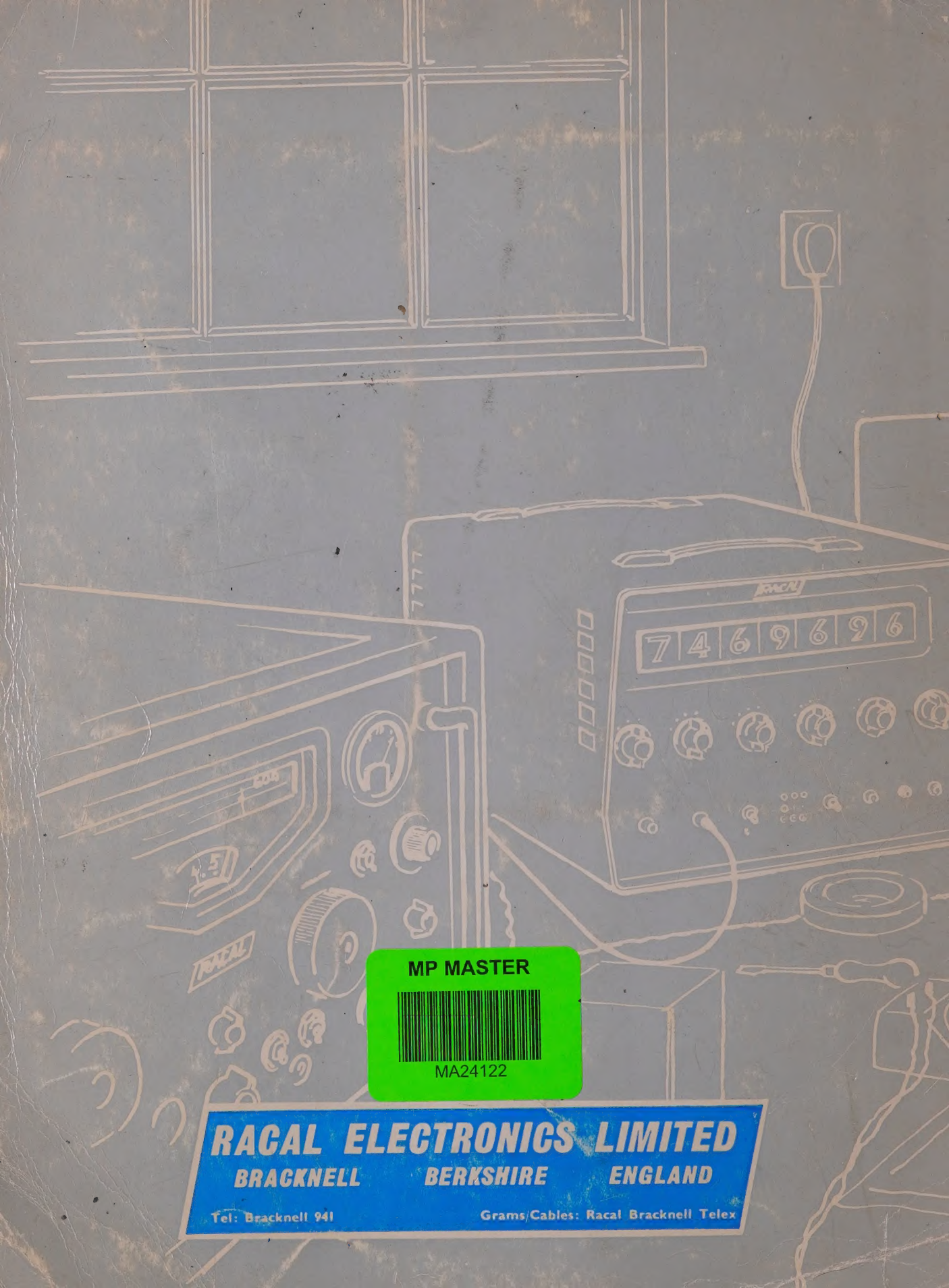
Date of Purchase .....

Name of Supplier.....

Address of Supplier.....

The guarantee for this equipment will not be effective unless this form is returned duly completed.

RACAL ELECTRONICS Ltd., WESTERN ROAD, BRACKNELL, BERKS.



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MA24122

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